PHYS 251
HW 9

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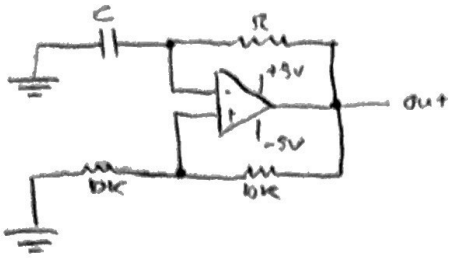
7.1



Switching @ $\frac{1}{2}$ Supply voltage

Flips @ $\pm$ 2.9V

$V(+) = \frac{V_0}{2}$

$V(+) = 1.5 V_0 e^{-t/RC}$

$0.5 V_0 = 1.5 V_0 e^{-t/RC}$

$\frac{1}{3} = e^{-t/RC}$

$t = 1.1 RC$

$t = 1.1 RC$

7.2

when @ 10v, discharges through ground and R_B

$V(+) = V_0 e^{-t/RC}$

$5 = 10 e^{-t/2C}$

$\frac{1}{2} = e^{-t/RC}$

$t = 0.693 RC$

Charging 5v to 15v

$V(+) = V_0 (1 - e^{-t/RC})$

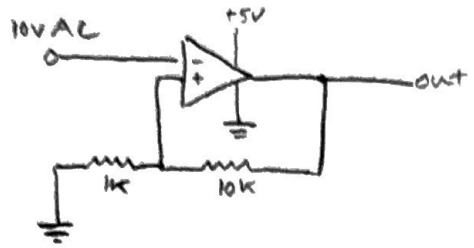
$5 = 10 (1 - e^{-t/R_A + R_B})$

$\frac{1}{2} = 1 - e^{-t/R_A + R_B}$

$T = 0.693 (R_A + R_B) C$

$T = 0.693 (R_A + R_B) C$

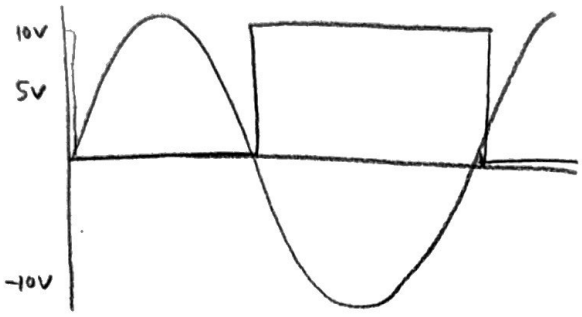
Comparator handout No. 3



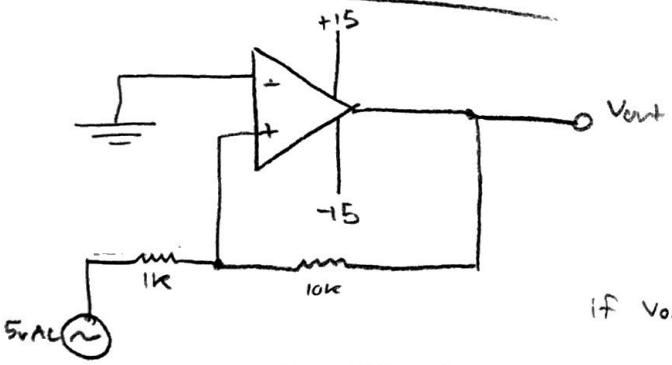
when $V_{out} = 5V$

$$V+ = \frac{1K}{11K} V_{in} = \frac{1}{11} V_{in}$$

$$V+ = \frac{1}{11}(10v) = 0.45V$$



Comparator handout No. 4



if $V_{out} = 15V$, Then $V+ = 0$

$$15 - I(10K) = 0$$

$$I = \frac{15}{10K} \Rightarrow$$

$V_{out} = 15V$

$$0 - 1000I = V_{AC}$$

$$\frac{-15(1000)}{10,000} = \frac{-15}{10} = -1.5V = V_{AC}$$

$V_{out} = -15V$

$$V_{AC} - 1000I = 0$$

$$V_{AC} = \frac{+1000(15)}{10000} = \frac{15}{10} = 1.5V$$

flips between

$-1.5V = V = 1.5V$